THE CLASSES™

25 December 2020
17:53

Integration in 15 sec.

$d(\sin x) = \cos x$ $\qquad d(\tan x) = \sec^2 x$

$d(\sec x) = \sec x \cdot \tan x$ $\qquad d(\cos x) = -\sin x$

$d(\cot x) = -\csc^2 x$

$d(\csc x) = -\csc x \cdot \cot x$

$$\int \sin^m x \cdot \cos^n x \, dx$$

Brahmastra

	m	n	
1	odd natural	$\times$	$\rightarrow \cos x = t$
2	$\times$	—	$\rightarrow \sin x = t$
3	a	b	$\rightarrow a+b = m+n = -$neg. integer $\rightarrow \tan x = t$
4	even natural	even natural	$\rightarrow$ pleasy with cos

1. $\int \cos^5 x \, dx$ Normal method

$\cos x\,dx = dt$, $\sin x = t$

$\Rightarrow \int (\sqrt{1-t^2})^4 dt$

$\Rightarrow \int (1-t^2)^2 dt$

$=$

$\int (\cos^4 x)\cos x \, dx = \int (\cos^2 x)^2 \cos x \, dx$

$= \int (1-\sin^2 x)^2 \cos x \, dx$

Let $\sin x = t$, $\cos x \, dx = dt$

$= \int (1-t^2)^2 dt$

$= \int (1 + t^4 + 2t^2) dt$

$= t + \frac{t^5}{5} + \frac{2t^3}{3} + c$, $t = \sin x$

2 — $\int \sin^5 x \, dx$

$= \int \sin^4 x (\sin x \, dx)$

$-\sin x \, dx = dt$, $\cos x = t$

$-\int (\sqrt{1-t^2})^4 dt$

$= t + \frac{t^5}{5} + \frac{2t^3}{3} + c$

$t = \cos x$

③ $\int \frac{1}{\sin^6 x} dx = \int \sin^{-6} x \, dx$

Put $\tan x = t$ $\qquad = \int \left(\frac{t}{\sqrt{t^2+1}}\right)^{-6} \frac{\sec^2 dt}{\sec^2 x}$

$\sec^2 x \, dx = dt$

$\Rightarrow \int \frac{t^4 + 1 + 2t^2}{t^6} dt \qquad \Rightarrow \int \frac{(t^2+1)^{\frac{6}{2}}}{t^6} \times \frac{dt}{(t^2+1)}$

$\Rightarrow \int \frac{1}{t^2} + \frac{1}{t^6} + \frac{2}{t^4} \, dt \qquad \tan x = t \qquad \int \frac{(t^2+1)^2}{t^6} dt$

④ $\Rightarrow \int \sin^3 x \cdot \cos^{-1} x \, dx$. Pending

⑤ $\int \cos^4 x \, dx \qquad 2\cos^2 x = 1 + \cos 2x$

$\Rightarrow \int (\cos^2 x)^2 dx$

$= \int \left(\frac{1 + \cos 2x}{2}\right)^2 dx$

$= \frac{1}{4} \int (1 + \cos^2 2x + 2\cos 2x) \, dx$

$= \frac{1}{4} \left(x + \sin 2x + \int \frac{1 + \cos 4x}{2} dx\right)$

$4 I_4 = (\sin x \cdot \cos^3 x) + 3 I_2$

Bhrmhastra

$\boxed{\int \cos^n x \, dx \quad n I_n = (\sin x \cdot \cos^{n-1} x) + (n-1) \times I_{n-2}}$

Redn formula

H.W. ⑥ $\int (\sec^{4/3} x \cdot \csc^{8/3} x \, dx)$

Agle video me soln btaunga

$$\int \frac{\sin^3 x}{\cos x}\,dx \Rightarrow \int \sin^3 x \cos^{-1} x\,dx$$

$\cos x = t$

$-\sin x\,dx = dt$

$\sqrt{1-t^2}$, 1, t

$$= -\int \left(\sqrt{1-t^2}\right)^2 \frac{1}{t}\,dt$$

Now time to da hard sum which can't solved by above method. So stay tune if you like this video then please like ,subscribe, share, comment down….

① $\int \sec^3 x\,dx \Rightarrow \int \sec x\,(\sec^2 x\,dx) = \int \left(\sqrt{t^2+1}\right) dt$

$\Rightarrow \int \cos^{-3} x\,dx$

$\tan x = t$

$\sec^2 x\,dx = dt$

$\sqrt{t^2+1}$, t, 1

② $\int \tan^4 x\,dx$

NOTE: here 3 will not apply

$\Rightarrow \int \frac{\tan^3 x}{\sec x}(\sec x \tan x\,dx)$

$\sec x = t$

$\sec x \tan x\,dx = dt$

$\sqrt{t^2-1}$, t, 1

$\Rightarrow \int \frac{\left(\sqrt{t^2-1}\right)^3}{t}\,dt$

$\Rightarrow \int \left(\frac{t^2-1}{t^{\frac{2}{3}}}\right)^{\frac{3}{2}} dx$

$= C\,\frac{(t^2-1)^{\frac{3}{2}}}{t^{\frac{2}{3}\times\frac{3}{2}}}$

③ $\int \tan^3 x\,dx$

$\Rightarrow \int \frac{\tan^2 x}{\sec x}(\sec x \tan x\,dx)$

④ $\int \frac{\sin^3 \alpha}{\sqrt{\cos\alpha}}\,d\alpha$

$\sqrt{\cos\alpha} = t^2$

$\cos\alpha = t^2$

$-\sin\alpha\,d\alpha = 2t\,dt$

$\sqrt{1-t^4}$, 1, t^2

$\Rightarrow -\int \frac{\sin^2\alpha\,(-\sin\alpha\,d\alpha)}{\sqrt{\cos\alpha}}$

$\int \frac{(1-t^4)\,2t\,dt}{}$ $\qquad \int (1-t^4)\,dt \quad + C$

$$\Rightarrow -\int \frac{(1-t^4)\, 2t\, dt}{t} = -2\int (1-t^4)\, dt + C$$

$$= -2\left(t - \frac{t^5}{5}\right)$$

$t = \sqrt{\cos x}$

Thank you

Subscribe The Classes

Like Share Comment.